



## Editorial

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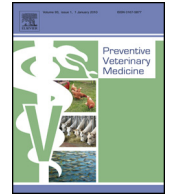
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## Editorial



At the 2014 Society for Veterinary Epidemiology and Preventive Medicine conference in Dublin, many studies were presented which applied advanced methodologies in the search for explanations and solutions to complex challenges to animal, human and environmental health. Among the papers presented, the eight contained within this special edition of Preventive Veterinary Medicine demonstrate the high quality science of this conference, in which time is allowed for presentation and discussion of advanced and multidisciplinary methodologies to support decision-making at all organisational levels. The papers focus on important topics in veterinary epidemiology and preventive medicine today, namely movements, interactions and management of farmed animals, spatiotemporal patterns of wildlife diseases and roaming dogs, and systematic review and longitudinal studies on drug resistance.

In the first paper, Lange et al. aimed to support urgent management decisions concerning African swine fever (ASF) at the wildlife-livestock interface in the southern Russian Federation. They developed a new algorithm on the basis of case reports using spatial and temporal associations between observed diagnostic data to discriminate between endemic and non-endemic patterns of case occurrence. Based on the algorithm and the diagnostic data available an endemic situation for ASF in wild boar of the region was not supported. This is important knowledge for decision makers, who are planning and implementing control strategies for ASF that is currently spreading in Eastern Europe.

In the second paper, Pruvot et al. report on an investigation of inter-species contact structures of beef cattle and wild elk in Southwest Alberta, Canada, to facilitate assessment of the risk of pathogen transmission between farmed cattle and wildlife. The authors used resource selection modelling to identify factors influencing elk presence on cattle pasture and elk selection of foraging patches based on interview data from 15 ranchers and global positioning system (GPS) data from 168 elk in seven cattle herds. Remote sensing data were used to characterise pastures, patches

and landscape, and annual and seasonal time scales and intensity of pasture use was modelled using negative binomial regression. The authors concluded that elk generally avoided cattle, which would reduce the risk of direct transmission of pathogens between the species, except during winter months. Human-managed features such as cultivated hay land and mineral supplements were found to attract elk to cattle pastures and hence may increase inter-species pathogen transmission through indirect contacts. The study highlights the usefulness of combining multiple data sources to achieve new insights.

Another study in which data collected using GPS proved useful was provided by Dürr and Ward, who analysed the roaming behaviour of 69 domestic, free-ranging dogs in six Aboriginal and Torres Strait Islander communities in northern Australia. They estimated the home range and utilisation distribution, which are parameters needed in epidemic models of diseases such as rabies, and they used four different methods of spatiotemporal data analysis. Generally dogs roamed around the dog owner's house in circles within median ranges from 0.2–0.4 ha up to 2.5–5.3 ha, depending on analysis method used. However, some individuals were found to roam much more widely (40–104 ha) and cover large areas of their own community or occasionally beyond, including when they were taken for hunting outside the community. These far-roaming dogs are of particular interest for infectious disease transmission between communities, and to/from wildlife.

In the fourth study, we move to Africa, where Bettridge et al. measured occurrence and interactions of three viral (Newcastle disease, Marek's disease and infectious bursal disease) and two bacterial diseases (*Pasteurella multocida* and *Salmonella*), as well as three families of endo- and ectoparasites (*Ascaridida*, *Eimeria* and lice) in 1056 village chickens in Ethiopia. Four cross-sectional surveys were conducted at 6-month intervals. Redundancy analysis, a technique which combines regression analysis with principal component analysis, was used to explore the complex dataset and potential relationships between the diseases

in question and certain risk factors. Correlation between serological responses to *Pasteurella* and *Salmonella* was consistent throughout the analyses. However, few of the location, management and housing conditions were identified as risk factors for infection, and the developed models explained a limited amount of the variation in the data. Detected sex differences in risk of parasitism may suggest differences in the way that the immune systems of male and female chickens interact with the disease agents. Based on the high disease exposure prevalences and some interesting interactions between disease agents found in the study, the authors concluded that a number of infectious pathogens and their interactions are likely to impact village chicken health and production.

Animal trade is a known strong risk factor for transmission of many diseases between farms. However, trade patterns are highly complex and incorporating them into surveillance systems is a challenge. Frössling et al. proposed a new, promising method to identify high-risk cattle herds and influential contacts between herds by calculating a probability of disease ratio for herds in simulated datasets, as well as for real herds based on animal movement data from Swedish bovine dairy herds included in a bulk tank milk survey for *Coxiella burnetii*. The method provides a new way to assess herd disease risk in animal movement networks that is more directly applicable to risk-based surveillance programmes than previously described network analyses of trade patterns.

The increasing complexity of animal health challenges in farming calls for multi-disciplinary analytic approaches. This is exemplified in the paper by Santman-Berends et al. who investigated the potential for reducing calf mortality in Dutch dairy herds. After the initial descriptive analysis of census data, a survey of 236 farmers indicated that an observed increase in calf mortality in the Netherlands in the later years might be related to priorities, time management and the mind-set of farmers. This led to the conduct of a case-control questionnaire study to detect risk factors for mortality among calves <1 month old in 100 dairy farms with increased calf mortality compared to 100 dairy farms with stable and below average calf mortality. Finally, a qualitative sociological study based on in-depth interviews with 30 farmers of herds with high calf mortality highlighted factors of importance to reduce calf mortality: farmers' awareness of calf mortality, farmers' sense of being powerless and unable to find solutions, and inconsistent management practices. This new knowledge can support decision-making in future calf mortality reduction strategies.

Systematic reviews followed by meta-analysis are increasingly employed to utilise information in the growing body of published studies. Falzon et al. synthesised available data from primary research on factors associated with resistance in antihelmintic drugs (AHR) used to control gastro-intestinal nematodes in sheep. Ten out of 131 studies initially deemed relevant for full publication review were included in the quantitative synthesis,

and meta-analysis was performed for five factors. High frequency of treatment was a significant and biologically important risk factor for AHR, while there was limited evidence of an association of the four remaining factors with AHR: mixed-species grazing, flock size, use of long-acting drug formulations, and drench-and-shift pasture management. Unclear reporting, selection or confounding bias was possible or present in more than half of the 131 studies. Consequently, several of the current recommendations on parasite management are not evidence-based, and the study highlighted an urgent need for improving study designs and reporting of observational studies.

The last study also addresses the growing concern of drug resistance; this time antimicrobial resistance. The study by Brunton et al. is a longitudinal field trial carried out on a farm known to harbour cefotaximase (CTX-M)-producing *E. coli*. The aim was to assess the impact of feeding waste milk containing antibiotic residues on the prevalence of these bacteria in the faeces of calves and the environment of calves in treatment (i.e. fed waste milk from antibiotic treated cows) and control groups. A fourth generation cephalosporin was detected in waste milk, and all environmental sampling locations yielded CTX-M-producing *E. coli*. Significantly more pen floor samples were positive, and higher shedding of CTX-M-producing *E. coli* was detected in calves in the treatment group than the control group throughout the study period. These findings indicate that feeding waste milk containing antibiotic residues increases the amount of resistant bacteria shed in the faeces. Shedding of CTX-M-producing *E. coli* also persisted for longer in the treatment group, and continued after weaning. This paper provides important new knowledge for addressing a major growing animal and public health concern in livestock farming.

This special edition provides an excellent overview of current, advanced veterinary epidemiological research being conducted all over the world for the benefit of animal health. It is important to recognise the work done by the members of the local organising committee in Ireland, which enabled such a varied selection of work to be presented in a superb location.

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